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containing the impurity of the first conductivity type, said bipolar transistor having:

a high-concentration doped layer being provided in said emitter layer and doped with the impurity of the first conductivitry type at a higher concentration than in said emitter layer,

wherein a composition of a material composing said emitter layer is the same as that of a material composing said high-concentration doped layer,

said high-concentration doped layer is a barrier layer from the viewpoint of holes in said base layer, and

a Ge composition ratio in said base layer increases from a region in contact with the emitter layer toward a region in contact with the collector layer, and thereby said base layer has a portion with a band gap gradually decreasing from a region of said base layer in contact with the emitter layer toward a region of said base layer in contact with the collector layer.

REMARKS

At the outset, the Examiner is thanked for the review and consideration of the present application.

The Examiner's Office Action dated October 8, 2002 has been received and its contents reviewed. By this Amendment claim 1 has been amended, and claim 9 has been canceled. Accordingly, claims 1-8, and 10 are pending for consideration in the present application, of which claim 1 is independent. Filed concurrently herewith is a Request for a One-Month Extension of Time which extends the shortened statutory period for response to February 8, 2003. Accordingly, Applicants respectfully submit that this response is being timely filed and fully responsive to the Office Action. In view of the actions above and the remarks below, reconsideration and allowance of the pending claims are respectfully requested.

Referring to the detailed Office Action, claim 6 is rejected under 35 U.S.C. §112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regards as the invention. Specifically, the Examiner contends that the language "concentration of carrier" is unclear. In response, Applicants have amended claim 1 as

shown above, to recite the high concentration doped layer is a barrier layer from the view point of holes in the base layer. Support for the language can be found at least in, e.g., page 37, lines 11-13 of the specification. Accordingly, the §112, second paragraph, rejection is requested to be reconsidered and withdrawn.

Claims 1, and 5-7 stand rejected under 35 U.S.C. §102(e) as anticipated by Yagura et al. (U.S. Patent No. 5,719,415 – hereafter Yagura). Further, claims 2-4 7 stand rejected under 35 U.S.C. §103(a) as unpatentable over Yagura in view of Jorke (U.S. Patent No. 5,798,539 – hereafter Jorke), and claims 8-10 stand rejected under 35 U.S.C. §103(a) as unpatentable over Yagura.

As amended, claim 1 recites, among other things, the composition of the emitter layer being the same as that of the high-concentration doped layer. Support for this feature can be found at least in the language "σ-doped layer 11" and "Si emitter layer 5" in, for example, page 36, lines 14 and 24 of the specification. The rest of the amendment of claim 1 can be found at least in. e.g., page 36, lines 21-25 and cancelled claim 9.

On the other hand, an object of Yagura is performing a selective etching for AlGaAs/GaAs or GaInP/GaAs. Thus, the second emitter layer 8 of Yagura is composed of AlGaAs, and an etching stop layer 7, which corresponds to the high-concentration doped layer in the present invention, is composed of GaAs, as disclosed in col. 4, lines 43-48 of Yagura. Applicants respectfully assert that if the second emitter layer 8 and the etching stop layer 7 were composed of the same material, not only the second emitter layer 8 but also the etching stop layer 7 would be etched, and that the etching stop layer 7 would not fulfill its own role. Consequently, it is essential that the composition of the second emitter layer 8 is different from that of the etching stop layer 7 in Yagura.

Moreover, the energy band structure in Yagura is illustrated in an attached illustration Figure A. As can be seen from the attached illustration, holes are collected in the etching stop layer 7. Therefore, the etching stop layer 7 in Yagura cannot be a barrier for the holes.

On the other hand, turning to the present invention again, the claimed high-concentration doped layer of claim 1 is a barrier for the holes. As such, prevention of the reverse injection of the holes from the base layer into the emitter layer, which is an object of the claimed invention, is achieved. However, Yagura fails to suggest the reverse injection of the holes.

Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. Lindemann Maschinenfabirk Gmbh v. American Hoist & Derrick, 221 USPQ 481, 485 (Fed. Cir. 1984). Yagura clearly fails to disclose structure positively recited and claimed in Applicant's amended independent claim 1. Particularly, Yagura fails to disclose at least a composition of a material composing the emitter layer being the same as that of a material composing the high-concentration doped layer. Accordingly, the §102(e) rejection of claims 1, and 5-7 is respectfully requested to be reconsidered and withdrawn.

With respect to the §103(a) rejection of claims 2-4 over Yagura in view of Jorke, Applicants respectfully assert that Jorke discloses the Ge concentration increasing from the collector layer toward the emitter layer, as shown in col. 3, lines 10-12 of Jorke. On the other hand, according to amended claim 1, the Ge composition increases from the emitter layer toward the collector layer. Hence, the slope of the Ge composition of the presently claimed invention is clearly contrary to that of Jorke.

The requirements for establish a *prima facie* case of obviousness, as detailed in MPEP § 2143 - 2143.03 (pages 2100-122 - 2100-136), are: first, there must be some suggestion or motivation, either in the reference themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference to combine the teachings; second, there must be a reasonable expectation of success; and, finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. Therefore, as Yagura is deficient in a composition of a material composing the emitter layer being the same as that of a material composing the high-concentration doped layer, and as Jorke is deficient in a Ge composition increasing from the emitter layer toward the collector layer, their combination in a §103(a)

rejection would be improper.

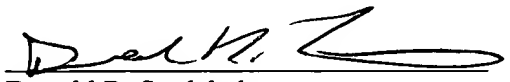
With respect to the §103(a) rejection of claims 8-10, the arguments set forth above with respect to claim 1 are also applicable. Further, with the cancellation of claim 9, the rejection of claim 9 is rendered moot.

In view of the amendments and arguments set forth above, Applicants respectfully request reconsideration and withdrawal of all pending rejections.

CONCLUSION

Having responded to all rejections and objection set forth in the outstanding non-Final Office Action, it is submitted that claims 1-8 and 10 are now in condition for allowance. An early and favorable Notice of Allowance is respectfully solicited. In the event that the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, the Examiner is courteously requested to contact Applicants' undersigned representative.

Respectfully submitted,



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MARKED UP VERSION

1. (Amended) A bipolar transistor comprising an emitter layer containing an impurity of a first conductivity type, a base layer containing an impurity of a first conductivity type, a base layer containing an impurity of a second conductivity type, and a collector layer containing the impurity of the first conductivity type, said bipolar transistor having:

a high-concentration doped layer being provided in said emitter layer and doped with the impurity of the first conductivitry type at a higher concentration than in said emitter layer,

wherein a composition of a material composing said emitter layer is the same as that of a material composing said high-concentration doped layer,

said high-concentration doped layer is a barrier layer from the viewpoint of holes in said base layer, and

a Ge composition ratio in said base layer increases from a region in contact with the emitter layer toward a region in contact with the collector layer, and thereby said base layer has a portion with a band gap gradually decreasing from a region of said base layer in contact with the emitter layer toward a region of said base layer in contact with the collector layer.